agMAG
CONNECTING YOU TO NEBRASKA AGRICULTURE
Issue 4

TEACHER'S GUIDE

AG MAG: OUR RESPONSIBILITY: NEBRASKA'S NATURAL RESOURCES

NEBRASKA STATE EDUCATION CONTENT STANDARDS CONNECTION

Can support standards aligned to Nebraska Language Arts Standards Adopted in 2021

LA.4.RI.1	Analyze an individual, event, scientific idea or concept, or steps in a process.
LA.4.RI.5	Integrate information from multiple informational texts on the same topic in order to demonstrate knowledge of the topic.
LA.4.RI.6	Identify an author's claim(s) and explain how the author supports the claim in the text.
LA.4.RI.8	Read and comprehend a wide range of informational texts of appropriate complexity for Grade 4 independently and proficiently.
LA.4.V.1	Acquire and use grade-level academic vocabulary appropriately.
LA.4.W.2.a	Use prewriting activities and resources to plan, organize, and draft writing.
LA.4.W.6	Locate and summarize relevant evidence from literary and/or informational text sources to answer questions about a topic.
La.4.SL.1	Prepare for and participate in structured discussions and collaborations about 4th grade topics and texts.
LA.4.SL.2.b	Convey a perspective with clear reasoning and support.
LA.4.SL.2.c	Identify the purpose and credibility of information being presented.

Can support standards aligned to Nebraska Social Studies Standards adopted in 2019

SS4.3.1.c	Determine why things are located where they are in Nebraska.
SS.4.3.2.a	Identify criteria used to define regions in the state of Nebraska and the United States.
SS.4.3.2.b	Classify regions and places within the state of Nebraska using physical and human features.

SS4.3.3.a	Identify physical processes that shape Nebraska's features and patterns.
SS4.3.3.b	Identify examples of ecosystems in Nebraska and describe related environmental issues.
SS4.3.3.d	Describe how humans have adapted to Nebraska's physical environment and use available natural resources.
MA 4.1.2.b	Multiply a four-digit whole number by a one-digit whole number.

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AGMAG INTEGRATION IDEAS

READING CENTER IDEAS & RESOURCES FOR *AGMAG*

What's the Big Idea?
How do we identify the main theme or "big idea" in what we read? Use the "What's the Big Idea?" worksheet included in this guide. Have students read content and identify the big idea and explain at least two supporting details. This can be done per page or per article/section.

Cause and Effect
Students can identify and explain cause and effect which shows how one thing is the cause of another. Have students complete the "Cause and Effect" worksheet as they read pages or articles. On pages 4-5 there is a specific cause and effect section included—the worksheet can be used for articles throughout the rest of *AgMag*.

Nebraska Interactive Map
The Nebraska Interactive Map is a place for students to learn, explore, and discover information. There are maps for geographical, agricultural, economical, environmental, and historical data and information. There are even teacher resources on how to utilize the maps and include ready-made activities. Many maps and activities complement *AgMag* and will be highlighted throughout the Teacher's Guide. The Nebraska Interactive Map can be used in other parts of your classroom too! View the map at *www.nefbmap.org*.

OUR RESPONSIBILITY - NEBRASKA'S NATURAL RESOURCES - PAGE 1

- Prior to distributing *AgMag*, have students complete a "Photo Chat."
  Photo Chat Instructions:
  - Post pictures (samples included in this guide) around the room.
  - Provide Photo Chat Response Sheet to students.
  - Have students work with a partner and travel to each of the photos. They should look carefully at the picture and create a list of natural resources in the photo.
  - With their partner, discuss ways farmers and ranchers use these resources, recording them on the response sheet.
  - Then have each pair partner up with another pair and share answers, adding new information to their response sheets. (If there's time, you can have multiple rotations of this!)

- Have pairs report about what they included on their response sheet.
- Lead class discussion on student responses. Use some additional questions such as: "Why did you select those natural resources?" and "Why do you think they are so important to farmers and ranchers?"
- Explain that the class will be exploring Nebraska's natural resources, how farmers and ranchers conserve them, and what we can do to help conserve them, too.
- Ask the class to define/explain what conserve means in terms of natural resources:
  - *"Protect from harm or destruction"*
- Distribute *AgMag* to each student and read through page 1 together.

- Complete "Think and Discuss" together as a class or in small groups.
  - After reading page 1, what surprises you about the role natural resources play in agriculture?
  - Why is it so important for farmers and ranchers to care about and conserve natural resources?
  - What do you predict are additional ways agriculture is dependent upon natural resources?

NEBRASKA SOIL–IT IS MORE THAN JUST DIRT! - PAGE 2

- As a class, read the introduction and complete "What's Under Our Feet?"
  - Correct answers (in order, top to bottom, with additional information):
    - *This top layer, **humus**, contains decomposed organic matter like leaves and branches.*
      - Humus is also known as the "O" horizon and is a layer of organic material and organisms also called residue.
    - *Known as **topsoil**, this dark-colored layer is where seeds germinate and roots grow. It contains a mix of minerals and organic matter.*
      - Topsoil is also known as the "A" horizon. Most plant roots grow in this layer and it holds most of the soil's nutrients.
    - *This layer is mostly sand and silt. This is due to the process called **leaching**, where minerals and clay are moved downward when water drips through the soil.*
      - Leaching is also a part of the subsoil.
    - *This layer, **subsoil**, contains clay and minerals like iron and aluminum.*
      - Subsoil is also known as the "B" horizon and contains sand, silt, and some nutrients that have "leached" from layers above
    - ***Bedrock**: the make up of this layer is mostly broken up rock.*
      - Bedrock is also known as the "R" horizon.

  - Soil profiles can vary greatly depending upon where in the United States they are located and how soils have been cared for or conserved over time.

- Have students complete the Edible Soils activity below and create their own soil profile (individually, in small groups, or as a whole class).
  - Supplies:
    - Clear plastic cups for each student
    - Spoons
    - Candy coated chocolate
    - 2-3 boxes of chocolate pudding (prepared)
    - Gummy worms
    - ½ cup (or more!) colored sprinkles
    - Chocolate sandwich cookies, crushed
    - ½ cup coconut flakes
    - Yellow, brown or green food coloring
    - Labels or paper for:
      - Bedrock
      - Subsoil
      - Topsoil
      - Organisms (Humus)
      - Residue (Humus)
      - Earthworms
  - Getting Ready
    - Prepare the pudding according to the directions on the package.
    - Place chocolate sandwich cookies into a sealed plastic bag and crush using a rolling pin. Or you can use a food processor to crush the cookies.
    - Add a couple of drops of food coloring to the coconut flakes in a plastic container or baggy. Shake for 30 to 45 seconds. Pour coconut onto paper towels to dry (about an hour).
  - Procedure
    - Review the layers of a soil profile labeled diagram on page 2. Explain to students that they will be making their own edible soil profile.
    - You will first be showing the group each layer of soil and demonstrating how to make an edible soil profile. Each student will then be able to make their own.
    - Place each soil layer ingredient by its appropriate label
      - candy coated chocolate = 'bedrock'
      - chocolate pudding = 'subsoil'

  - crushed chocolate sandwich cookies = 'topsoil'
  - colored sprinkles = 'organisms' in humus layer.
  - coconut flakes = 'residue' in humus layer.
  - gummy worms = 'earthworms'
- Place spoons with each of the soil layer ingredients.
- Demonstrate making the soil layers of your edible soil.
- Put a spoonful of candy-coated chocolates into the bottom of an individual cup; discuss what bedrock is. Repeat this procedure with all of the other layers.
- Have students prepare their own profiles and enjoy eating them!

- As a review, ask students to re-cap each layer of the soil profile.

- Have students look around their desk, personal items, and classroom and identify 3-4 items with different textures.
  - Have students share and describe the different textures of the items.
  - Explain that soil has different textures (how it feels to the touch).
  - Have students read (individually or as a class) the Soil Scenes section.
  - Discuss as a class or have students respond to questions posted on a writing surface:
    - What are the different soil textures?
    - What does soil texture determine?
    - What is the relationship between soil texture and water?
  - For more information and activities, check out this website: *https://kidsgardening.org/lesson-plans-soil-texture-and-composition*
- Have students read the Career Spotlight: Agriculture Protects the Soil section.
  - As a class, explore additional soil-related careers.
- To access additional soil resources, activities, and videos on soil, check out these links:
  https://www.soils4teachers.org/lessons-and-activities
  https://www.soils4kids.org/experiments
  https://www.kidsdiscover.com/teacherresources/dirt-soil
- Interactive Map Project
  - Use the link to access maps including: Soil Types and Regions of Nebraska which all relate to content on page 2.
    https://www.nefbfoundation.org/educators/teacher-resources/interactive-map-project
  - Activity: Soil Type Versus Corn Production
    http://www.nefbmap.org/resources.php

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WATER–YESTERDAY, TODAY, AND TOMORROW! - PAGE 3

- Provide students two copies of the "What's the Big Idea" worksheet. Have them read the content on page 3 and complete one worksheet for the Career Spotlight and one worksheet for the other content.
  - As a class, discuss what the "big ideas" are and what additional details each student identified.
- Have students complete the Cool Water Facts section.
  - Correct responses:
    - Water covers about **70%** of the earth's surface.
    - **97.2%** of the earth's water is salt water. 2.8% is freshwater for human and animal needs.
    - The longest river is the **Missouri** which is the eastern border of Nebraska.
    - Water from 31 states drains into the **Mississippi** River.
    - A **watershed** is the area of land that water drains off of and into a lake or stream.
    - The earth recycles the same water over and over through a process called the **hydrologic cycle**.
- To learn more about how a watershed works, access the "Wad a Watershed" and "There's a Watershed in My Backyard" lesson plan activities from the Nebraska Farm Bureau Foundation website. Use this link:
  https://www.nefbfoundation.org/educators/teacher-resources/lesson-plan-activities
- Because water doesn't replenish, we need to utilize it carefully and conserve it. Use one of these resources to guide a discussion with students on how they can conserve water:
  - *https://wateruseitwisely.com/kids*
  - *https://quiethut.com/water-conservation-for-kids*
  - *http://www.thewaterpage.com/water-conservation-kids.htm*
- For activities that tie together both soil and water, access the "Our World—Soil & Water" lesson plan activity from the Nebraska Farm Bureau Foundation website. Use this link:
  https://www.nefbfoundation.org/educators/teacher-resources/lesson-plan-activities
- Interactive Map Project
  - Use the link to access maps including: Ogallala Aquifer, Rainfall, and Acres Irrigated, which all relate to content on page 3.
    https://www.nefbfoundation.org/educators/teacher-resources/interactive-map-project

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NEBRASKA FARMERS AND RANCHERS–TAKING CARE OF NATURAL RESOURCES - PAGES 4-5

- Have students read the content about Shane Greving and Alec Ibach, including the Agriculture and Conservation terms.
  - Have istudents complete the following as they read:
    - Write at least three "why" questions. Explain that writing and asking these questions is one way to understand the information and will test others' ability to explain their understanding.
    - Have students, one at a time, share their questions rapid-fire and see if others can answer them. Write any questions that students can't answer on a writing surface. Pause on answering questions or providing any clues at this time. Allow all students to ask their questions.
    - Return to the posted questions. Provide clues or guidance from information on pages 4-5. See what questions learners can answer with less time pressure and some clues. Explore together any remaining questions or give them as an assignment for students to learn more about with research etc.
- Have students complete the Cause and Effect section on page 5 and/or use the "Cause and Effect" worksheet at the end of this guide.
  - Example responses might include:
    - Cause: planting cover crops use excess nutrients in the soil
      Effect: prevents nutrients from going into groundwater
    - Cause: grazing rotations keep grass and vegetation healthy
      Effect: soil erosion is prevented, and moisture is retained in the soil
- Interactive Map Project
  - Use the link to access the map about Ecosystems
    https://www.nefbfoundation.org/educators/teacher-resources/interactive-map-project

HIGH-TECH WAYS TO PROTECT SOIL AND WATER - PAGE 6

- Post the question: "In what ways do we predict technology is used to conserve soil and water?"
  - With a partner, have students brainstorm answers to the question.
  - Report out ideas to the class.
- Have students read the information about high-tech applications to conserving soil and water.
  - Have students underline, highlight, or "*" words, terms or phrases that aren't clear to them.

  - Create a comprehensive class list on a writing surface. As a large group (or you can divide into pairs/small groups and assign multiple areas), collectively find answers to the unknown words, terms, or phrases. This could be information shared from other students, the teacher, or internet searches and research.

- On a blank piece of paper, have students draw a technology invention they think could be used 10-20 years from now to conserve soil or water.
  - As a starting point, use what they brainstormed and what was read on page 6.
  - Their invention should be as creative as possible!
  - Have students be prepared to share and explain the invention to the class.
  - Option: have students work in pairs or small groups.
- Have students find information and complete the questions under "Nebraska-Home for Irrigation!"

NEBRASKA SOYBEANS: CONSERVING SOIL & WATER - PAGE 7

- Write S-O-Y-B-E-A-N vertically on a writing surface.
  - Ask the class what they know about soybeans. *Responses might include: raised in Nebraska, used in food and products, etc.*
  - As a class, talk about what products are made from soybeans. Use each letter in SOYBEAN and come up with one product starting with each letter. Example:
    S-soy milk
    O-oil
    Y-yogurt
    B-biodiesel
    E-edamame
    A-adhesives (like glue)
    N-noodles
  - Explain that soybeans are used for many things and are really important to Nebraska's economy. They also play a big role in helping to conserve soil and water.
- Have students read content about soybeans, soil, and water on page 7.
  - Have students circle the bolded vocabulary words and individually (or in pairs or small groups) write down definitions. Report out and share as an entire class.
  - Possible definitions include:
    - **Legume**: the fruit or seed of plants of the legume family (such as peas or beans) used for food.
    - **Nodules**: a swelling on a legume root that contains bacteria.
    - **Bacteria**: convert nitrogen gas in atmosphere into usable form for plants in the soil.

    - **Metric ton**: unit of weight equal to 1,000 kilograms.
    - **Irrigation**: applying water to land.
  - Have students summarize in their own words, soybeans' relation to soil and water. Share with a partner.
  - Complete the Metric Ton calculation.
    - Answer: 5 (metric tons) x 2,205 (pounds per 1 metric ton) = 11,025 pounds in 5 metric tons.
- Interactive Map Project
  - Use the link to access student activities and teacher resources for soil, water, and soybeans: *http://www.nefbmap.org/resources.php*
    Activity: Soil Type and Soybean Production
    Activity: Rainfall and Soybean Production

NATURAL RESOURCES CONSERVATION-TAKE ACTION! - PAGE 8

- Pair up students and take 30 seconds to brainstorm as many soil and water related careers as possible.
  - By show of hands, find out who had the most listed.
  - Report out responses to the entire class.
  - Like most agricultural areas, there are many career opportunities in soil and water. Have students read the two career spotlights on page 8 and review the other career spotlights in the issue: Andy Jobman, page 2; Matt Lukasiewicz, page 3; Austin Baldwin and Nicole Leonard, page 6. Have students answer the following questions:
    - What is their job title?
    - What do they do each day?
    - What is one unique or interesting fact about each person and their career?
  - Lead class discussion on soil and water careers based on student answers.
- Have students complete the middle section and place a "check" to show if they take these action steps to conserve soil and water.
- Complete the Digging Deeper questions about potential career opportunities.

Nebraska Agriculture in the Classroom is a program of the Nebraska Farm Bureau Foundation whose mission is to engage youth, educators, and the general public to promote an understanding of the vital importance of agriculture in the lives of all Nebraskans. To learn more or access an electronic version of this publication, visit us at **www.nefbfoundation.org** or contact the Nebraska Farm Bureau Foundation.

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Special thanks to these organizations for their continuous support: **Nebraska Corn Board, Nebraska Beef Council, Nebraska Pork Producers Association, We Support Ag, Nebraska Soybean Checkoff**, and **Nebraska Wheat Board**.

WHAT'S THE BIG IDEA?

ARTICLE: _____

MAIN IDEA:

_____

_____

_____

_____

_____

DETAIL NO. 1

_____

_____

_____

_____

_____

DETAIL NO. 2

_____

_____

_____

_____

_____

CAUSE AND EFFECT

ARTICLE: _____

CAUSE	EFFECT

CAUSE	EFFECT

Adobe Stock

PHOTO CHAT RESPONSE SHEET

I SEE.....

Travel to each picture and record all the natural resources you see in each one!

1. _____

2. _____

3. _____

4. _____

5. _____